

DETAILED ACTION

1. This Office action is in response to the Amendment filed on March 8, 2011.

Examiner's Amendment

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Glenn E. Von Tersch (Reg. No. 41,364) on October 11, 2010.

3. The application has been amended as follows:

IN THE CLAIMS (referring to claim set filed on March 8, 2011):

- (a) **Claim 6** has been amended as follows:

A method of operating a carbon nanotube head with a disk having tracks, comprising:

locating the carbon nanotube head at a desired track at a rough precision by positioning an actuator to which the carbon nanotube head is attached in relation to the desired track;

determining an offset for a read head of the carbon nanotube head based on the desired track through use of a controller, the controller coupled to the carbon nanotube head, the controller determining [[an]] the offset responsive to an angle of the actuator;

emitting an electron beam (e-beam) from a carbon nanotube of the carbon nanotube head;

tracking the track through the read head using the offset;

feeding back an indication of a location of the desired track at a fine precision;

adjusting the offset responsive to the feeding back;

adjusting a target of the carbon nanotube head responsive to the feeding back, the adjusting accomplished through deflection of ~~[[an]]~~ the e-beam of the carbon nanotube head;

writing data to the desired track from a write head of the carbon nanotube head;

reading data from the desired track after writing data to the desired track, the reading occurring prior to the disk rotating through a complete rotation, the data read from locations on the desired track where writing data has occurred immediately preceding the reading data, the reading data ~~occurring~~ occurring through use of the read head operating by deflecting the e-beam of the read head responsive to the offset;

wherein:

the read head of the carbon nanotube head including:

a base,

a substrate mounted on the base,

~~[[a]]~~ the carbon nanotube fixedly mounted on the substrate,

- a housing mounted on the base,
- the housing enclosing the carbon nanotube,
- a gating electrode mounted on the housing[[:]],
- a focus electrode mounted on the housing[[:]],
- a tracking electrode mounted on and within the housing,
- an acceleration electrode mounted on and within the housing,
- an opening in the housing opposite the carbon nanotube,
- a boron-nitride window mounted on the housing and completely closing the opening of the housing,

- a detection electrode mounted on an external surface of the housing, the detection electrode to detect electrons reflected from a recording medium;

and wherein:

the write head of the carbon nanotube head including:

- a base,
- a substrate mounted on the base,
- a carbon nanotube on the substrate,
- a housing mounted on the base,
- the housing enclosing the carbon nanotube,
- a tracking electrode mounted on and within the housing,
- an acceleration electrode mounted on and within the housing,
- an opening in the housing opposite the carbon nanotube,

a boron-nitride window mounted on the housing and completely closing the opening of the housing,

a detection electrode mounted on an external surface of the housing;

and wherein:

the deflection of the e-beam includes deflecting the e-beam such that the e-beam concurrently traverses a plurality of the tracks;

the tracking occurs based on signals received from the detection electrode of the read head; and

the adjusting the target occurs through operation of the tracking electrode of the read head.

(b) **Claim 21** has been amended as follows:

A method of operating a carbon nanotube head with a disk having tracks, comprising:

locating the carbon nanotube head at a desired track at a rough precision by positioning an actuator to which the carbon nanotube head is attached in relation to the desired track;

determining an offset for a read head of the carbon nanotube head based on the desired track through use of a controller, the controller coupled to the carbon nanotube head, the controller determining ~~[[an]]~~ the offset responsive to an angle of the actuator;

emitting an electron beam (e-beam) from a carbon nanotube of the carbon nanotube head;

tracking the track through the read head using the offset;
feeding back an indication of a location of the desired track at a fine precision;

adjusting the offset responsive to the feeding back;

adjusting a target of the carbon nanotube head responsive to the feeding back, the adjusting accomplished through deflection of [[an]] the e-beam of the carbon nanotube head;

wherein:

the read head of the carbon nanotube head including:

a base,

a substrate mounted on the base,

[[a]] the carbon nanotube fixedly mounted on the substrate,

a housing mounted on the base, a tracking electrode mounted on the housing,

an acceleration electrode mounted on the housing,

a detection electrode mounted on the housing;

and wherein:

the deflection of the e-beam includes deflecting the e-beam such that the e-beam concurrently traverses a plurality of the tracks;

the tracking occurs based on signals received from the detection electrode;
and

the adjusting the target occurs through operation of the tracking electrode.

(c) **Claim 22** has been amended as follows:

A method of operating a carbon nanotube head with a disk having tracks,
comprising:

locating the carbon nanotube head at a desired track at a rough precision;

determining an offset for a read head of the carbon nanotube head based
on the desired track, the determining of the offset being responsive to an angle of
an actuator to which the carbon nanotube head is attached;

emitting an electron beam (e-beam) from a carbon nanotube of the carbon
nanotube head;

tracking the track through the read head using the offset;

feeding back an indication of a location of the desired track at a fine
precision;

adjusting the offset responsive to the feeding back;

adjusting a target of the carbon nanotube head responsive to the feeding
back, the adjusting accomplished through deflection of ~~[[an]]~~ the e-beam of the
carbon nanotube head;

wherein:

the read head of the carbon nanotube head including:

a base,

a substrate mounted on the base,
[[a]] the carbon nanotube on the substrate,
a housing mounted on the base,
a tracking electrode mounted on the housing,
an acceleration electrode mounted on the housing,
a detection electrode mounted on the housing;

and wherein:

the deflection of the e-beam includes deflecting the e-beam such that the e-beam concurrently traverses a plurality of the tracks;

the tracking occurs based on signals received from the detection electrode;

and

the adjusting the target occurs through operation of the tracking electrode.

- (d) **Claim 23** has been amended as follows:

The method of claim 22, wherein:

the locating the carbon nanotube head at [[a]] the desired track at [[a]] the
rough precision occurs through positioning [[an]] the actuator to which the carbon
nanotube head is attached.

- (e) **Claim 24** has been amended as follows:

The method of claim 22, wherein:

the determining [[an]] the offset for [[a]] the read head based on the
desired track occurs through operation of a controller, the controller coupled to
the carbon nanotube head.

- (f) **Claim 25** has been amended as follows:

The method of claim 24, wherein:

the controller determines the offset responsive to ~~[[an]]~~ the angle of ~~[[an]]~~

the actuator ~~connected to the carbon nanotube head.~~

Reasons for Allowance

4. **Claims 6 and 21-25** allowed over the prior art of record.
5. The following is an examiner's statement of reasons for allowance:
 - (a) **In regard to claim 22**, the prior art of record alone or in combination fails to teach or suggest the bolded/italicized limitations of claim 22 in combination with the rest of the limitations of claim 22:

A method of operating a carbon nanotube head with a disk having tracks, comprising:
locating the carbon nanotube head at a desired track at a rough precision;
determining an offset for a read head of the carbon nanotube head based on the desired track, the offset being responsive to an angle of an actuator to which the carbon nanotube head is attached;
emitting an electron beam (e-beam) from a carbon nanotube of the carbon nanotube head;
tracking the track through the read head using the offset;
feeding back an indication of a location of the desired track at a fine precision;
adjusting the offset responsive to the feeding back;
adjusting a target of the carbon nanotube head responsive to the feeding back,
the adjusting accomplished through deflection of the e-beam of the carbon nanotube head;

wherein:

the read head of the carbon nanotube head including:

- a base,
- a substrate mounted on the base,
- the carbon nanotube on the substrate,
- a housing mounted on the base,
- a tracking electrode mounted on the housing,
- an acceleration electrode mounted on the housing,

a detection electrode mounted on the housing;
and wherein:
*the deflection of the e-beam includes deflecting the e-beam such that the e-beam concurrently traverses a plurality of the tracks;
the tracking occurs based on signals received from the detection electrode; and
the adjusting the target occurs through operation of the tracking electrode.*

- (b) **Claims 6 and 21** have similar allowable features as claim 22.
 - (c) **Claims 23-25** are dependent upon claim 22.
6. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark L. Fischer whose telephone number is (571) 270-3549. The examiner can normally be reached on Monday-Friday from 9:00AM to 6:30PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa Thi Nguyen can be reached on (571) 272-7579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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